

REMARKS

Reconsideration of the pending application is respectfully requested on the basis of the following particulars.

1. In the claims

As shown in the foregoing LIST OF CURRENT CLAIMS, the claims have been amended to more clearly point out the subject matter for which protection is sought.

Claims 1 and 12 are amended to recite a first intermediate cerium-based oxide layer consisting essentially of cerium and one or more solid solution formation elements and a second intermediate cerium-based oxide layer consisting essentially of cerium and one or more charge compensation elements, selected from the group consisting of Bi, Nb, Sb, Ta, and V. It is respectfully submitted that no new matter is added, since support for the amendments may be found, for example, at least in Examples 1-4 of the pending application where, for example, a mixed solution of naphthenates of Ce:Gd was used to create a first intermediate layer and a mixed solution of naphthenates of Ce:Nb was used to create the second intermediate layer.

Claims 11, 18, and 27-28 are left unchanged.

Entry of the LIST OF CURRENT CLAIMS is respectfully requested in the next Office communication.

2. Rejection of claims 1, 11, and 27 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Pat. No. 6,764,770 (Paranthaman *et al.*) in view of U.S. Pub. No. 2004/0157747 (Chen *et al.*)

Reconsideration of this rejection is respectfully requested on the basis that the rejection fails to establish a *prima facie* case of obviousness with respect to claim 1, from which claims 11 and 27 depend.

By way of review, amended claim 1 recites an intermediate layer formed on the surface of a substrate by sequentially disposing a first intermediate cerium-based oxide

layer and a second intermediate cerium-based oxide layer. The first intermediate cerium-based oxide layer consists essentially of cerium and one or more solid solution formation elements, while the second intermediate cerium-based oxide layer consists essentially of cerium and a charge compensation element.

As discussed in detail in the specification, the charge compensation element in an intermediate layer compensates for a charge mismatch created due to a difference between the electron valences of respective ions of Ce and the solid solution formation element and inhibits an ion diffusion in the oxide film (page 13, lines 16-23). The charge compensation element, by having a charge of +5 for example, helps improve the Tc by preventing a Ni element from diffusing into a superconductive layer (page 23, lines 4-9).

It is respectfully submitted that the proposed combination of the *Paranthaman* patent and the *Chen* publication fails to teach or disclose a first intermediate layer that essentially has cerium and a solid solution formation element and a second intermediate cerium-based oxide layer that essentially contains cerium and a charge compensation element as recited in amended claim 1.

The *Paranthaman* patent discloses a buffered substrate having a buffered layer selected from a group having the general formulas  $\text{RMnO}_3$ ,  $\text{R}_{1-x}\text{A}_x\text{MnO}_3$ , and combinations thereof (column 3, lines 12-24). R is selected from the group consisting of La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, and Y, and A is an element selected from the group consisting of Be, Mg, CA, Sr, Ba, and Ra (column 3, lines 21-24). However, as seen as the general structures of the buffer layer of the *Paranthaman* patent, manganese is an indispensable element in the buffer layer. In other words, the *Paranthaman* patent requires the use of manganese, while the structure of amended claim 1 recites a first intermediate cerium-based oxide layer that has essentially cerium and one or more solid solution formation elements, and a second intermediate cerium-based oxide layer that has essentially cerium and a charge compensation element.

MPEP 2111.03 states, “[t]he transitional phrase ‘consisting essentially of’ limits the scope of the claim to the specified material or steps and those that do not materially affect the basic and novel characteristic(s) of the claimed invention” (internal quotations omitted). As applied to the current claims, it is respectfully submitted that the inclusion of the phrase “consisting essentially of” excludes all other elements that are not cerium or a solid solution formation element or charge compensation element, selected from the groups of elements recited in the claims, that would affect the operation/characteristics of the material. Since manganese is an indispensable element in the buffer layer of the *Paranthaman* patent, it is respectfully submitted the different oxidation states of manganese, which are completely different than the oxidation states of cerium and the transition metals selected from the group of Y, Nd, Sm... or Er, would alter the charge characteristics of the intermediate layer. In other words, the use of manganese as an indispensable element in the buffer layer would alter the charge characteristics of the buffer layer.

Moreover, it is respectfully submitted that one having ordinary skill in the art would not modify the buffer layer disclosed in the *Paranthaman* patent by removing the manganese to disclose the features as recited in amended claim 1. As discussed above in detail, the manganese in the buffer layer of the *Paranthaman* patent is an indispensable element. The manganese is used to provide a specific crystalline structure, i.e., orthorhombic or hexagonal, for the deposited textured surface (column 8, line 60 to column 9, line 10). It is then respectfully submitted that removing the manganese from the buffer layer would then alter the characteristics of the buffer layer disclosed in the *Paranthaman* patent and change the disclosure of the *Paranthaman* patent. Therefore, it is respectfully submitted that the *Paranthaman* patent at most discloses a buffer layer that indispensably uses manganese.

Turning to the *Chen* publication, the *Chen* publication discloses a buffer layer doped with  $\text{CeO}_2$  based oxide film to improve property matching between the high  $T_c$  superconductor and a metallic substrate (paragraph [0016]). The inventors of the *Chen*

publication have found that a single buffer layer for the integration of high T<sub>c</sub> superconducting (HTS) films with metallic substrates can be formed by doping cerium oxide interposed between the HTS film and the metallic substrate (paragraph [0032]). However, the *Chen* publication fails to disclose a second intermediate layer having essentially cerium and a charge compensation element that to compensate the charge mismatch from the first intermediate layer having essentially cerium and a solid solution formation element as recited in amended claim 1.

Although the Office Action dated August 31, 2010 asserts on page 4 that it would have been obvious to a person of ordinary skill in the art to perform the process of *Paranthaman* with cerium oxide intermediate layers containing a solid solution formation element, a charge compensation element or both, in view of the teaching of *Chen*, it is respectfully submitted that the Office Action has used improper hindsight bias in making that determination.

It is respectfully submitted that only through the disclosure of the present application, is one having ordinary skill in the art taught of an intermediate layer that has a first intermediate layer having essentially cerium and one or more solid solution formation elements and a second intermediate layer having essentially cerium and one or more charge compensation elements, selected from the groups of elements recited in amended claim 1. These intermediate layers are associated with a certain charge characteristic, which are compensated by using a second intermediate layer having charge compensation elements that compensate the charge imbalance between the electron valences of the associated ions of cerium and the solid solution formation element in the first intermediate layer.

On the other hand, since the *Paranthaman* patent discloses using manganese as an indispensable element in a buffer layer, it is respectfully submitted that extensive experimentation would be required to match the charge characteristics associated with the RMNO<sub>3</sub> layer when modifying the cerium oxide layer by the proposed teachings of the

*Chen* publication. In other words, one having ordinary skill in the art could not simply substitute the cerium oxide layer taught by the *Chen* publication with the cerium oxide layer of the *Paranthaman* patent to disclose the features recited in amended claim 1. It is respectfully submitted that manganese has various oxidation states that would affect the charge characteristics of the corresponding layer. In order to compensate the layer having manganese as an indispensable element, one having ordinary skill in the art would have to experiment with the enumerated list of potential elements that are suitable to combine with the cerium oxide layer of the *Chen* publication, which is beyond simple substitution.

Although some of the elements disclosed in the *Chen* publication can compensate charges, it is respectfully submitted that amended claim 1 recites the unique combination of a first intermediate layer having essentially cerium and a solid solution formation element and a second intermediate layer having essentially cerium and a charge compensation element, selected from the groups of elements recited in the claims, that compensates for a charge mismatch attributable to a difference between the electron valences of respective ions of cerium and the solid solution formation element. This functional recitation of the second intermediate cerium-based oxide layer inhibits ion diffusion in the oxide film. It is respectfully submitted that simply substituting the cerium oxide layer of the *Chen* publication with the cerium oxide buffer layer in the *Paranthaman* patent would not meet this limitation.

Since the proposed combination of the *Paranthaman* patent and the *Chen* publication fails to disclose or suggest each and every feature recited in amended claim 1, a *prima facie* case of obviousness cannot be established with respect to amended claim 1, from which claims 11 and 27 depend.

Accordingly, withdrawal of this rejection is respectfully requested.

3. Rejection of claims 12, 18, and 28 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Pat. No. 6,764,770 (*Paranthaman et al.*) in view of U.S. Pub. No. 2004/0157747 (*Chen et al.*) and further in view of U.S. Pat. No. 5,444,040 (*Kojima et al.*)

Reconsideration of this rejection is respectfully requested on the basis that the rejection fails to establish a *prima facie* case of obviousness with respect to claim 12, from which claims 18 and 28 depend.

The method recited in claim 12 includes the features recited in claim 1, and discussed above in detail. In particular, claim 12 requires, at least in part, an intermediate layer formed by sequentially disposing onto a metal substrate a first intermediate cerium-based oxide layer and a second intermediate cerium-based oxide layer. The second intermediate cerium-based oxide layer is different from the first intermediate cerium-based oxide layer, where the first intermediate cerium-based oxide layer consists essentially of cerium and a solid solution formation element selected from the group consisting of Y, Nd, Sm, Gd, Eu, Yb, Ho, Tm, Dy, La and Er and the second intermediate cerium-based oxide layer consists essentially of cerium and a charge compensation element selected from the group consisting of Bi, Nb, Sb, Ta and V.

The deficiencies of the *Paranthaman* patent and *Chen* publications are discussed above in detail with respect to claim 1, and are equally applicable here.

It is respectfully submitted that the *Kojima* patent fails to provide for the shortcomings of the *Paranthaman* patent and the *Chen* publication, as discussed above in detail with respect to claim 1.

Therefore, a *prima facie* case of obviousness cannot be established with respect to claim 12, from which claims 18 and 28 depend, and withdrawal of this rejection is respectfully requested.

4. Conclusion

As a result of the amendment to the claims, and further in view of the foregoing remarks, it is respectfully submitted that the application is in condition for allowance. Accordingly, it is respectfully requested that every pending claim in the present application be allowed and the application be passed to issue.

Please charge any additional fees required or credit any overpayments in connection with this paper to Deposit Account No. 02-0200.

If any issues remain that may be resolved by a telephone or facsimile communication with the applicants' attorney, the examiner is invited to contact the undersigned at the numbers shown below.

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